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FLATHEAD RIVER CREEL REPORT, 1992-1993

FINAL REPORT

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INTRODUCTION

A roving creel survey was conducted on the **Flathead** River system, May 1992 through May 1993, as part of Hungry Horse Dam Fisheries Mitigation, funded by Bonneville Power Administration. The river creel survey was conducted in conjunction with a **Flathead** Lake creel survey. This document summarizes the creel survey on the river system. The purpose of these creel surveys was to quantify fishery status prior to mitigation efforts and provide replicative survey methodology to measure success of future mitigation activities.

DESCRIPTION OF PROJECT AREA

The **Flathead** River system is a tributary to the **Clarks** Fork of the Columbia River originating in northwest Montana and southern British Columbia. The North and Middle forks of the **Flathead** River define the western and southern boundaries for Glacier National Park and drain mostly public lands, including the **Flathead** National Forest and Bob Marshall and Great Bear wilderness areas. Both forks are free-flowing and popular with recreationists for scenic, fishing and whitewater float trips. Hungry **Horse** Dam impounds the South Fork of the **Flathead** River near the town of Hungry Horse and provides flood control and electrical power production. The South Fork was not included in this creel survey, since the fishery no longer has a direct connection to **Flathead** Lake.

The North and Middle forks converge near the town of Coram at Blankenship Bridge. Downstream, near the town of Hungry Horse, the South Fork merges forming the main stem **Flathead** River which flows roughly 45 river miles through the **Flathead** Valley to **Flathead** Lake. Below the South Fork confluence, the river meanders in a single channel for most of the distance downstream to the city of Kalispell. A few islands divide the channels **enroute**. The lower 22 miles upstream from **Flathead** Lake are influenced by lake elevations controlled by Kerr Dam located on the **Flathead** Lake outlet. The dam raises the lake level 10 feet and reduces the river gradient and velocity. Upstream of this lake influence the river braids into a number of channels. In the lower reach, there are also a number of abandoned river channels, which have formed sloughs providing boating and fishing opportunities for warmwater and coolwater fish species.

The North Fork **Flathead** flows 58 miles downstream from the U.S./Canada border to its junction with the Middle Fork **Flathead**. The North Fork has some whitewater rapids, but most of the river is easily navigated. The North Fork provides outstanding scenic views of Glacier National Park and good fishing for adfluvial westslope cutthroat trout migrating to or from **Flathead** Lake. The Middle Fork **Flathead** flows 45 miles from the mouth of Bear Creek to its confluence with the North Fork. Upstream from Bear Creek the Middle Fork flows through the Great Bear Wilderness and access is limited. The Middle Fork is characterized by whitewater rapids and generally lower **gamefish** populations, so recreational use is centered more on recreational rafting with angling being a lower priority use.

Three native **gamefish** are present in the **Flathead** River system, bull trout (*Salvelinus confluentus*), westslope cutthroat trout (*Onchorhynchus clarkii*) and mountain whitefish (*Prosopiumwilliamsoni*). There are also a number of exotic **gamefish** in the river and slough system including rainbow trout (*O. mykiss*), eastern brook trout (*S. fontinalis*), lake trout (*S. namaycush*), Lake Superior whitefish (*Coregonus clupeaformis*), northern pike (*Esox lucius*) and largemouth bass (*Micropterus salmoides*). In addition, there are a number of **nongame** fish including yellow perch (*perca flavescens*), northern squawfish (*Ptychocheilus oregonensis*), peamouth (*Mylocheilus caurinus*), longnose suckers (*Catostomus catostomus*) and largescale suckers (*C. macrocheilus*).

The westslope cutthroat and bull trout have adfluvial life histories involving both **Flathead** Lake and the interconnected river system. Other fish species are generally residents of either the lake or river, but may make seasonal excursions between the two waterbodies. The construction and operation of Hungry Horse and Kerr dams have had profound effects on the fisheries.

METHODS

Angler use patterns and pressure have changed in the **Flathead** River system in the 12 years since the previous creel census (Fredenberg and Graham 1982). To establish present river use and fishery information, we conducted a creel survey on the main stem **Flathead** River and the North and Middle forks. This effort was conducted simultaneously with a roving creel survey of **Flathead** Lake. Methods used in the river survey were similar to those presented in detail in the lake survey (Evarts and **DosSantos** 1994).

The upper **Flathead** River system presents a complex survey problem because of river length, intermingled administrative jurisdiction and limited angler access. Roving census procedures were used because of the expansive drainage and widely dispersed access points of the river fishery. Roving census permitted contact with boat and shore anglers in proportion to their actual abundance. Three creel clerks collected data May through September and one clerk worked October through March. Fishing pressure estimates were based on random instantaneous angler counts. Catch and angler characteristics were collected through an interview process. Pressure, harvest and catch were calculated by a FORTRAN program developed by Montana Fish, Wildlife & Parks, from formulas of Neuhold and Lu (1957).

Survey Sample Design

The survey consisted of **stratified** simple random sampling. Stratified sampling reduced sampling variance by grouping homogenous sub-populations (Evarts and **DosSantos** 1994). Survey data were stratified by river reach, boat or shore angler, month and day type (weekend/holiday or weekday).

The main stem and both river forks were divided into sections, based on access and reach characteristics (Figure 1). The main stem **Flathead** River was separated into four sections, the North Fork was separated into three sections and the **Middle** Fork was separated into two sections. These sections correspond to the stream reaches identified in previous creel surveys (Hanzel 1977, Fredenberg and Graham 1983).

Clerks conducted surveys on all river reaches from the opening of fishing season, May 16, 1992 through November 30, 1992, the end of the regular stream fishing season (Table 1). Sampling continued at reduced frequency during the extended whitefish season, when trout fishing is restricted to and catch-and-release only (December 1, 1992 through May 1, 1993). The main stem **Flathead** River was closed to all fishing from May 1 through May 14, 1993. The survey effort was limited to ice-free areas during extremely cold weather periods. Survey results from sloughs connected to the lower main stem Flathead- River were included with pressure and harvest estimates in Section 1 of the main stem **Flathead** River. The sloughs were open all year to fishing.

Data were expanded on a monthly basis. Monthly time units were selected because they provided adequate sample size without extending into periods with dissimilar fishery characteristics. The creel survey began in mid May 1992, and ended in mid May 1993. These two half-month periods were combined and treated as one full month.

Days were considered the primary sample units. Ten holidays were grouped with weekend days for sampling. For each month, weekdays and weekend days were analyzed as separate groups. Weekend and holiday pressure was usually higher than weekday pressure (Hanzel 1985) and was sampled twice the rate of weekdays. Daily fishing hours were defined as those hours between sunrise and sunset and we assumed little or no fishing occurred at **night**. Sample days were randomly selected within each stratum (weekdays or weekends/holidays) (Table 1). The rate of sampling was seasonally adjusted to fit fishing patterns, weather and budgetary constraints.

Angler Counts

We counted anglers in two ways, instantaneous aerial counts and by ground surveys of fishing accesses. Aerial counts were conducted from a Cessna 172 fixed-wing aircraft flying north up the main stem **Flathead** River from **Flathead** Lake to Bad Rock Canyon above Columbia Falls. Aerial counts were conducted at varying times of day. Times within each sample day were randomly selected between sunrise and sunset. Boats and shore anglers were counted. No aerial counts were conducted in the North or Middle forks or in Section 4 of the main stem river.

Ground surveys were conducted by traveling upstream and downstream from the main stem into the forks on each survey date. Clerks counted vehicles, boats and shore anglers. When possible, clerks conducted angler interviews (Table 1, Figure 2). Clerks also placed creel cards (Figure 3) on vehicle windshields at access sites when anglers could not be contacted directly. Cards and interviews were used to determine what percentage of boaters were

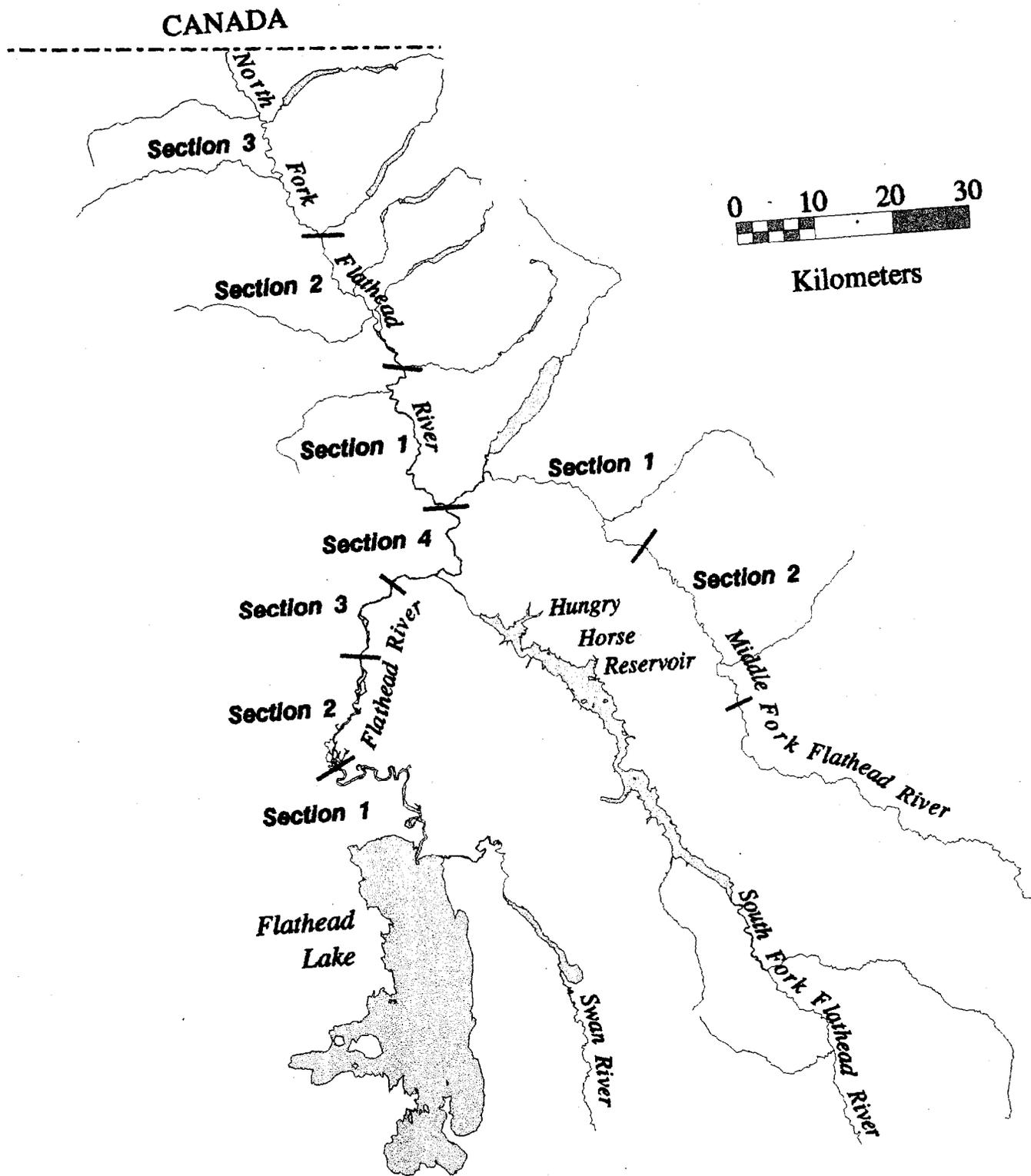


Figure 1. Study area showing locations of the nine river sections.

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1				A	A		AVNM	AVNM			AVNM	
2	M	A	A	A	A			AVNM	AVN	AVNM		
3		A	VP	AV	A	AVNM			AVN			
4	V		A	A	A	AVNM	AVNM			AVNM		
5			VP	A				AVNM				
6			AVN	AV		AVNM						VNM
7		VN	A			AVNM	AVNM	AVNM	AVN	AVNM	VNM	V
8			A	AVM	VN		AVNM		AVNM		VNM	
9			A	A				AVNM			VNM	
10	V	AV	P	AV								
11		P	A	A		AVN	AVNM	VNM		AVNM		
12		A	VNP	AV		AVNM	AVNM	A	AVN	AVNM		
13		A	A	AVNM				AVNM				AVM
14	A			A		AVNM	AVNM			AVN	VNM	
15	AV	A		P				AVNM				AVM
16		P		A		AVNM	AVN	AVNM	AVNM			
17		P		A	AVNM	AVNM						
18			V				AVN					
19	A		AV	A			AVN	VNM	AVNM		AVNM	
20			P	VP		AVNM	VN	A				
21	A		AV	A		AVN	A					
22		A	VP	AVNM	AVNM			VNM			AVNM	
23	A	P	A	VNP								
24	A	A	A	AV			AVNM	AVNM	AVNM	AVNM	AVM	AV
25	A		AVN	A	AVN	AVNM		AVNM				
26	A	P				AVNM	AVNM		AVNM	AVNM		
27	A			VP	AVN			AVNM	AVNM		VNM	
28	V	A	AV	AV	AVN	AVNM					AV	
29	A		P	A		VNM	AVNM	AVNM		AVN		
30	A		AVM	V				AVNM				
31	A		AV		AVNM		AVNM	AVNM				
V=VEHICLE COUNT IN MAIN STEM RIVER SECTIONS 1, 2, 3, OR 4												
P=VEHICLE COUNT IN MAIN STEM RIVER SECTIONS 1 OR 2 ONLY												
N=VEHICLE COUNT IN NORTH FORK SECTIONS												
M=VEHICLE COUNT IN MIDDLE FORK SECTIONS												
A=AERIAL COUNT IN MAIN STEM RIVER SECTIONS												

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Table 1. Days sampled during Flathead River creel survey, 1992- 1993.

**FLATHEAD RIVER SYSTEM
1992 ANGLER CONTACT REPORT FORM'**

ID# _____ River & Area _____ Location _____
 Main FHR= 1; NF FHR=2; MF FHR=3; Other=4
 Number Anglers in Party/Boat _____ Angler Origin _____ (by Angler)

Starting (Time) _____ HRS. Contact (Time): _____ HRS Completed Trip: _____
 1=Completed 2=Left Card 3=Checking Station

Total Angling Hours _____ Angling Preference _____
 (anglers X hours) CT= 1; DV=2; WF=3; Comb/or/Any=4

Catch: # Caught # Killed

 Bull trout

 Cutthroat trout

 Lake trout

 Lake or Mt. whitefish

 Others

Comments: _____

ID# _____ River & Area _____ Location _____
 Main FHR= 1; NF FHR=2; MF FHR=3; Other=4
 Number Anglers in Party/Boat _____ Angler Origin _____ (by Angler)

Starting (Time) _____ HRS. Contact (Time): _____ HRS Completed Trip: _____
 1 = Completed 2=Left Card 3 = Checking Station

Total Angling Hours _____ Angling Preference _____
 (anglers X hours) CT= 1; DV=2; WF=3; Comb/or/Any=4

Catch: # Caught # Killed

 Bull trout

 Cutthroat trout

 Lake trout

 Lake or Mt. whitefish

 Others

Comments: _____

Origin Key: 1-Kalispell, 2-Other Flathead County; 3-Lake Co., 4-Missoula Co., 5-Other Western Co., 6-Eastern Montana, 7-West States(E or W of Rocky Mts.), 8-Eastern States, 9-Foreign

Fish Species: RB-rainbow trout, EB-brook trout, LMB-largemouth bass, NP-Northern Pike

Figure 2. Angler contact report form used to interview anglers.

Card No. _____

When you finish fishing today, PLEASE record the number of hours fished, and your fish catch information:

TOTAL HRS FISHED TODAY: _____

CATCH DATA:* #CAUGHT #KILLED

Bull trout

Cutthroat trout

Lake trout

Lake / Mountain whitefish

Others:

Fish Species: RB-rainbow trout, EB-brook trout, LMB-largemouth bass, NP-Northern Pike

*-State sizes if available.

Please complete and mail to help us manage this river. Thanks!

NUMBER OF PEOPLE traveling in **this vehicle** today. _____

SINGLE PRIMARY ACTIVITY FOR EACHPERSON, related to nearby stream:

_____ number of BANK OR WADING ANGLERS

_____ **number of anglers FISHING FROM BOAT/RAFT**

_____ number of **RECREATIONAL BOATERS**, not **fishing**

_____ number **engaged in OTHER** activities

(PLEASE SPECIFY):

(_____)

IF INDIVIDUAL COMPLETING THIS CARD fished the nearby stream, how long did you personally fish? _____ HOURS _____ MINUTES. How many trout did you personally catch (including catch and release)? _____ TOTAL TROUT CAUGHT.

CARD NO. _____

THANKS FOR YOUR HELP!

Figure 3. Creel cards left on vehicles at survey points.

anglers. If no interview or creel card data were collected during a given month on weekdays or weekends, no pressure could be estimated from aerial boat counts within that stratum. Likewise, angler and non-angler numbers per vehicle were determined from creel card results. Catch and harvest information was collected through angler interviews and creel cards. Catch and harvest rates were based on both complete and incomplete fishing trips.

We believed that aerial counts more accurately portrayed instantaneous angler use than ground surveys. Concurrent aerial and ground surveys for Section 3 in the main stem river, which best represented upstream reaches, were used to develop an index to compare the two survey types. In Section 3, the aerial survey method resulted in a pressure estimate of 4,831 hours of shore angling and 3,034.5 hours of boat angling during July and August. The concurrent vehicle survey estimated pressure to be 4,157 hours of shore angling and 3,397 hours of boat angling during July and August. These values produced aerial to vehicle count ratios of 1.16 and 0.89 for shore and boat indices, respectively. These indices were combined with vehicle surveys to calculate pressure estimates for Section 4 of the main stem, and for the North and Middle fork sections. Modified angler counts were then processed with the creel program to estimate pressure, harvest and catch.

For both forks of the river, interview data for catch and harvest by shore and boat anglers were combined. Boat interviews comprised 9.5 percent (61) of total interviews (643) on the North Fork. On the Middle Fork, 63.8 percent (74) of interviews (116) were boat anglers. In the main stem, only 3.0 percent (28) of interviews (927) were boat anglers. The majority of boating angler surveys on the Middle Fork were collected by interviewing fishing guides. A check station was run on the North Fork Road at Canyon Creek to collect angler interview data. The station was manned during the last two hours on each survey date. Road and residential patterns on the Middle Fork Flathead precluded use of a check station at existing staffing levels. All raw and analyzed data are on file at the Montana Fish, Wildlife & Parks, Fisheries Division, Kalispell, Montana.

RESULTS AND DISCUSSION

Angling Pressure

Main Stem Flathead River

Total angling pressure for the Flathead River from Blankenship Bridge to Flathead Lake (Sections 1-4) was 52,834 hours (Table 2). July and August had the greatest pressure, 10,114 and 8,989 hours, respectively. Summer months, May through August, contained the highest pressure followed by October, November and December which included angling pressure associated with the lake whitefish fishery, including commercial hook-and-line angling (Table 2). Lake whitefish migrate into the Flathead River from the Flathead Lake to spawn. Most whitefish have been observed from September through January. April had the lowest angler pressure with 518 hours. For the entire year, weekends/holidays comprised 48 percent (25,401 hours) of total angling pressure.

MONTH	SEC1		SEC2		SEC3		SEC4		TOTAL		
	Shore	Boat	Shore	Boat	Shore	Boat	Shore	Boat	Shore	Boat	
JAN	W-R-ENDS	356.4	132.0	0.0	0.0	0.0	70.4	35.2	558.8	35.2	
	WK-DAYS	512.0	312.0	0.0	0.0	0.0	192.0	0.0	1,016.0	0.0	
	TOTAL	868.4	444.0	0.0	0.0	0.0	262.4	35.2	1,574.8	35.2	1,610.0
FEB	WE-ENDS	229.5	91.8	0.0	0.0	0.0	0.0	0.0	321.3	0.0	
	WK-DAYS	276.9	443.0	0.0	0.0	0.0	0.0	0.0	719.9	0.0	
	TOTAL	606.4	634.6	0.0	0.0	0.0	0.0	0.0	1,041.2	0.0	1,041.2
M A R	WK-ENDS	37.8	377.6	0.0	188.8	0.0	0.0	0.0	604.2	0.0	
	WK-DAYS	74.0	345.4	0.0	0.0	0.0	0.0	0.0	419.4	0.0	
	TOTAL	111.8	723.0	0.0	188.8	0.0	0.0	0.0	1,023.6	0.0	1,023.6
A P R	WK-ENDS	12.2	60.9	0.0	0.0	0.0	0.0	0.0	73.1	0.0	
	WK-DAYS	20.1	401.9	0.0	0.0	0.0	0.0	23.2	422.0	23.2	
	TOTAL	32.3	462.8	0.0	0.0	0.0	23.2	23.2	495.1	23.2	518.3
M A Y	WK-ENDS	680.7	716.6	0.0	573.3	0.0	55.7	55.7	2,026.3	55.7	
	WK-DAYS	1,018.4	1,307.2	0.0	608.0	0.0	380.0	760.0	3,313.6	760.0	
	TOTAL	1,699.1	2,023.8	0.0	1,181.3	0.0	436.7	816.7	5,339.9	815.7	6,155.6
J U N	WK-ENDS	268.3	1,159.2	0.0	579.6	0.0	305.9	1,046.5	2,313.0	1,046.5	
	WK-DAYS	509.2	1,306.1	0.0	664.1	0.0	354.2	737.9	2,833.6	737.9	
	TOTAL	777.6	2,465.3	0.0	1,243.7	0.0	660.1	1,784.4	5,146.6	1,784.4	6,931.0
JUL	WK-ENDS	76.5	1,212.8	1,177.5	471.0	1,483.7	141.3	1,112.7	1,901.6	3,773.9	
	WK-DAYS	124.7	863.5	978.6	422.2	460.5	506.6	1,082.3	1,917.0	2,521.4	
	TOTAL	201.2	2,076.3	2,156.1	833.2	1,944.2	647.9	2,195.0	3,818.6	6,295.3	10,113.9
AUG	WK-ENDS	51.4	298.3	1,453.7	216.0	1,090.3	648.0	1,501.7	1,213.7	4,045.7	
	WK-DAYS	42.0	235.2	1,209.6	151.2	0.0	705.6	1,386.0	1,134.0	2,595.6	
	TOTAL	93.4	533.5	2,663.3	367.2	1,090.3	1,353.6	2,887.7	2,347.7	6,641.3	8, SSS. 0
SEP	WENDS	0.0	438.8	0.0	117.0	0.0	195.0	156.0	750.8	156.0	
	WK-DAYS	37.2	223.4	248.2	148.9	0.0	382.2	436.8	791.7	685.0	
	TOTAL	37.2	662.2	248.2	255.9	0.0	6,777.2	592.8	1,542.5	841.0	2,383.5
OCT	WK-ENDS	54.5	1,798.5	0.0	417.8	0.0	109.0	363.3	2,379.8	363.3	
	WK-DAYS	52.0	1,415.0	0.0	104.1	0.0	38.2	0.0	1,609.3	0.0	
	TOTAL	106.5	3,213.5	0.0	521.9	0.0	147.2	363.3	3,989.1	363.3	4,352.4
N O V	WK-ENDS	25.6	1,867.0	0.0	51.2	0.0	40.9	20.5	1,984.7	20.5	
	WK-DAYS	0.0	2,709.4	0.0	117.8	0.0	220.9	44.2	3,048.1	44.2	
	TOTAL	26.6	4,576.4	0.0	169.0	0.0	261.8	64.7	5,032.8	64.7	5,097.5
DEC	WR-FNDS	567.0	982.8	0.0	0.0	0.0	151.2	75.6	1,701.0	75.6	
	WK-DAYS	762.3	2,032.8	0.0	0.0	0.0	46.2	0.0	2,841.3	0.0	
	TOTAL	1,329.3	3,015.6	0.0	0.0	0.0	197.4	75.6	4,542.3	75.6	4,617.9
YEAR	WK-ENDS	2,359.9	9,136.3	2,631.2	2,614.7	2,574.0	1,717.4	4,367.2	15,828.3	9,572.4	
	WK-DAYS	3,428.8	11,594.9	2,436.4	2,216.3	460.5	2,825.9	4,470.4	20,065.9	7,367.3	
TOTAL	press	6,789	20,731	5,068	4,831	3,035	4,543	8,838	35,894.2	16,939.7	52,834
	days	3039	10891	2409	2609	1153	2785	3741	19,324.0	7,303.0	26,627

Table 2. Pressure estimates for the four main stem sections of the Flathead River, May 1992 - May 1993. ' were rounded to nearest hour or day.

The majority of boat angling occurred from May through October. Boat angling was greatest in July and August (6,295 and 6,641 hours, respectively), which was greater than shore angler pressure during those months (Table 2). Total boat angling pressure was underestimated because we were unable to collect boat angler data from creel interviews or mailing cards for certain strata and were thus unable to determine boat angler pressure for those strata (Table 3).

Section 1 (Flathead Lake Upstream to Salmon Hole)

During the aerial survey, boat angling was observed April through December in Section 1. However, we were unable to calculate boat angling pressure for Section 1 (Table 2), because there were no boat interviews collected (Table 3). Most boat fishing in Section 1 occurred in the sloughs, so this primarily underestimates use and harvest of warmwater and coolwater species. The shore angler column for pressure in Table 2 represents only the pressure from shore angling for Section 1. May and December received the greatest shore angler pressure, 1,699 and 1,329 hours, respectively. January and June also received relatively heavy fishing pressure. The pressure in winter months was predominantly ice fishing on river sloughs and backwaters. April, September and November received the least pressure.

Section 2 (Salmon Hole Upstream to Pressentine Bar)

Section 2 was the most heavily fished section of the main stem Flathead River with 49 percent (25,799 hours) of the total pressure for the main stem river. This section has popular fishing access points at the Old Steel Bridge and Highway 35 crossings, and provides a popular float fishing reach, Pressentine Bar access downstream to the Old Steel Bridge.

Shore angling was four times greater (20,731 hours) than the pressure exerted by boat anglers (5,068 hours). The fall (October, November and December) lake whitefish fishery, which included a commercial hook-and-line fishery, contributed the greatest amount of pressure for the section (Table 2). These three months accounted for 52 percent of the total shore angling and 42 percent of the total angling for the section. May, June, July and August also contained relatively high fishing pressure (Table 2). July and August had the greatest boat angling pressure for the section, 2,156 and 2,663 hours, respectively. There were no boat angler interviews available for May, June and weekends in September, and thus no pressure estimates for boat angling could be calculated during those months (Table 3). Weekend angling comprised 46 percent of pressure for the section.

Section 3 (Bad Rock Canyon Downstream to Pressentine Bar Access)

There were limited numbers of boat interviews in Section 3 (Table 3). Because there were no boat interviews in May, June and September, and weekdays in August, we could not calculate pressure estimates for boat angling during these periods, thus underestimating pressure from boat anglers. Angling pressure was greatest during July (2,837 hours) with

MONTH	SEC1		SEC2		SEC3		SEC4		TOTAL			
	Shore	Boat	Shore	Boat	Shore	Boat	Shore	Boat	Shore	Boat	Combined	
JAN	W&ENDS	9	0	10	0	0	0	1	0	20	0	
	WK-DAYS	10	0	12	0	0	0	0	0	22	0	
	TOTAL	19	0	22	0	0	0	1	0	42	0	42
FEB	W&ENDS	0	0	0	0	0	0	0	0	1	0	
	W-K-DAYS	5	0	9	0	0	0	0	0	14	0	
	TOTAL	5	0	10	0	0	0	0	0	15	0	15
	W&ENDS	0	0	4	1	1	0	0	0	5	0	
	WK-DAYS	0	0	0	0	2	0	0	0	2	0	
	TOTAL	0	0	4	1	3	0	0	0	7	1	8
	W&ENDS	1	0	0	0	1	0	0	0	3	0	
	W&DAYS	2	0	0	0	2	0	1	0	5	0	
	TOTAL	3	0	1	0	3	0	1	0	8	0	8
	W&ENDS	19	0	17	0	11	0	4	0	51	0	
	WK-DAYS	20	0	27	0	16	0	16	0	79	0	
	TOTAL	39	0	44	0	27	0	20	0	130	0	130
	W&ENDS	17	0	42	0	23	0	18	0	100	0	
	WK-DAYS	16	0	38	0	29	0	14	0	99	0	
	TOTAL	35	0	80	0	52	0	32	0	1 %	0	199
	W&ENDS	13	0	41	1	20	5	20	2	94	8	
	WK-DAYS	10	0	33	1	25	1	13	0	81	2	
	TOTAL	23	0	74	2	45	6	33	2	175	10	185
	W&ENDS	6	0	15	6	12	2	14	4	47	12	
	WK-DAYS	10	0	7	3	5	0	3	0	25	3	
	TOTAL	16	0	22	9	17	2	17	4	72	15	87
	W&ENDS	0	0	16	0	1	0	0	0	17	0	
	WK-DAYS	0	0	12	1	1	0	3	0	16	1	
	TOTAL	0	0	28	1	2	0	3	1	33	2	35
	W&ENDS	5	0	38	0	0	0	3	0	46	0	
	WK-DAYS	0	0	51	0	1	0	4	0	56	0	
	TOTAL	5	0	89	0	1	0	7	0	102	0	102
	W&ENDS	0	0	66	0	0	0	2	0	68	0	
	WK-DAYS	0	0	25	0	1	0	1	0	27	0	
	TOTAL	0	0	61	0	1	0	3	0	95	0	95
	W&ENDS	0	0	0	0	0	0	0	0	0	0	
	WK-DAYS	5	0	16	0	0	0	0	0	21	0	
	TOTAL	5	0	16	0	0	0	0	0	21	0	21
YEAR	W&ENDS	70	0	251	8	69	7	62	7	452	22	
	WK-DAYS	80	0	230	5	82	1	55	0	447	6	
TOTAL		150	0	481	13	151	8	117	7	899	28	927

Table 3. Number of shore and boat angler interviews conducted on the main stem Flathead River, May 1992 - May 1993.

boat angling comprising almost 69 percent (Table 2). Over 76 percent of boating pressure occurred on weekends (Table 2). Shore angling pressure was greatest during May and June. This section did not have increased pressure during the fall months as did sections 1 and 2. Over the year, weekend and weekday shore pressure estimates were similar, 2,615 and 2,216 hours, respectively.

Section 4 (Blankenship Bridge Downstream to Bad Rock Canyon)

Section 4 received the lowest amount of shore angling pressure of the main stem sections; however, it received the greatest observed amount of boat angling pressure (Table 2). The method of calculation, which combined vehicle counts with the aerial to vehicle index, influenced the boat pressure estimate of Section 3. This allowed us to use boat counts to estimate pressure, even though no interview or creel card data existed for some strata (Table 3). August had the greatest angling pressure from shore and boat, followed by July and June. Shore angling did not increase during fall as it did in sections 1 and 2. Shore angling comprised 34 percent of total pressure in the section. Weekday shore pressure (2,826 hours) was greater than weekend shore pressure (1,717 hours). Boat angling pressure was observed May through October. Boat angling pressure was equally divided between weekends and weekdays.

Pressure Estimate for the North Fork Sections

Angling pressure on the North Fork was limited to May through October (Table 4). Pressure rapidly increased from May to July, when it peaked (12,156 hours), and then rapidly declined through October. Fishing from shore was more popular than boat fishing during all months (Table 4). Total weekday pressure (16,421 hours) was greater than total weekend pressure (12,962 hours). In 1981, angling pressure for the North Fork was 21,911 hours (Fredenberg and Graham 1983).

Section 1, Camas Creek downstream to the Middle Fork confluence, received 77 percent of total angling pressure for the North Fork. Section 2, Kintla Creek downstream to Camas Creek, was similar in use to Section 3, Canadian border downstream to Kintla Creek (Table 4). The North Fork received roughly half the angling pressure of the main stem river and twice the angling pressure of the Middle Fork sections. In 1975, the main stem also received the majority of angling pressure followed by the North Fork and then the Middle Fork (Hanzel 1977).

Pressure Estimate for the Middle Fork Sections

According to the outfitter use records of the Hungry Horse Ranger District, Flathead National Forest, the Middle Fork received 97 percent of the 26,000 days of recreational boating on the North and Middle forks in 1992. However, the majority of boating on the Middle Fork was not for angling. This complicated the process of collecting interview data. The Middle Fork sections received less angling pressure than the North Fork or main stem

MONTH	NORTH FORK							COMBINED			MIDDLE FORK				COMBINED		
	SEC 1		SEC 2		SEC3		Shore	Boat	Shore	Boat	SEC 1		SEC 2		Shore	Boat	
	Shore	Boat	Shore	Boat	Shore	Boat					Shore	Boat	Shore	Boat			
JAN	WE-ENDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	WE-DAYS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FEB	WE-ENDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	WE-DAYS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAR	WE-ENDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	WE-DAYS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
APR	WE-ENDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	WE-DAYS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAY	WE-ENDS	267.5	33.4	41.8	0.0	279.0	0.0	3372	33.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	WE-DAYS	243.2	60.8	0.0	0.0	434	434	2866	104.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	TOTAL	510.7	94.2	41.8	0.0	713	434	6238	137.6	761.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUN	WE-ENDS	1,451.9	1,463.6	2415	2254	1127	128.8	1,806.1	1,817.8	0.0	5152	57.3	128.8	0.0	6440	573	0.0
	WE-DAYS	1,458.5	687.6	236.1	23.6	253.0	379.5	1,947.6	2,908.5	6,662.2	817.4	5449	2783	2,074.6	1,095.7	2,619.5	4,416.5
	TOTAL	2,910.4	2,151.2	477.6	249.0	365.7	508.3	3,753.7	2,908.5	6,662.2	1,332.6	602.2	407.1	2,074.6	1,739.7	2,676.8	4,416.5
JUL	WE-ENDS	2,496.3	1,801.6	392.5	219.8	1864	1727	3,077.2	2,194.1	0.0	1009	181.7	323.0	605.6	4239	7873	0.0
	WE-DAYS	3,730.3	1,865.2	3768	314.0	4145	184.2	4,521.6	2,363.4	12,156.3	1,248.8	1063	2,103.8	188.4	3,352.6	2947	0.0
	TOTAL	6,226.6	3,666.8	769.3	533.8	602.9	356.9	7,598.8	4,557.5	12,156.3	1,349.7	288.0	2,426.8	794.0	3,776.5	1,082.0	4,858.5
AUG	WE-ENDS	883.2	640	1662	177.2	2616	392.7	1,311.2	1,433.9	0.0	390.9	61.7	480.0	360	8709	977	0.0
	WE-DAYS	1,285.2	1,171.8	186.1	162.8	2160	1728	1,687.3	1,507.4	5,939.8	799.2	2,376	604.8	252.0	1,404.0	489.6	0.0
	TOTAL	2,168.4	2,035.8	352.3	340.0	477.8	565.5	2,998.5	2,941.3	5,939.8	1,190.1	299.3	1,084.8	288.0	2,274.9	587.3	2,862.2
SEP	WE-ENDS	6318	0	585	0	702	0	7605	0	0.0	156.0	0	117.0	0	2730	0	0.0
	WE-DAYS	1,001.0	879.7	1706	2048	182.0	212.3	1,353.6	1,296.8	3,410.9	7280	0.0	68.0	0	7960	0	0.0
	TOTAL	1,632.8	979.7	229.1	204.8	252.2	212.3	2,114.1	1,296.8	3,410.9	884.0	0.0	185.0	0	1,069.0	0	1,069.0
OCT	WE-ENDS	81	0	109.0	0	0	0	1908	0	0.0	0.0	0	0	0	0	0	0.0
	WE-DAYS	2616	0	0	0	0	0	261.6	0	0.0	0.0	0	0	0	0	0	0.0
	TOTAL	343.4	0	109.0	0	0	0	452.4	0	452.4	0.0	0.0	0	0	0	0	0.0
NOV	WE-ENDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	WE-DAYS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DEC	WE-ENDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	WE-DAYS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
YEAR	WE-ENDS	5,812.5	4,162.6	1,009.5	622.4	651.0	6942	7,483.0	5,479.2	29,383	1,1630	300.7	1,048.8	6416	2,211.8	9423	3,154.1
	WE-DAYS	7,979.8	4,665.1	9696	705.2	1,108.9	992.2	10,058.3	6,362.5	29,383	3,593.4	888.8	3,054.9	2,515.0	6,648.3	3,403.8	10,052.1
TOTAL	press days	13,792	8,828	1,979	1,328	1,770	1,686	17,541	11,842	29,383	4756	1190	4104	3157	9860	4346	13296
	days	6457		745		774		7,879			1075		873		1948		

Table 4. Pressure estimates for the North and Middle fork sections of the Flathead River, May 1992 - May 1993. Total pressure estimates were rounded to nearest hour or day.

sections (Table 4). Similar to the North Fork, pressure on the Middle Fork peaked in July and was limited to June through September. Pressure was similar between sections 1 and 2 (Table 4). Shore angling comprised 80 percent and 57 percent of total pressure for sections 1 and 2, respectively. Fishing pressure was roughly three times greater during weekdays than weekends in both sampling sections.

Catch and Harvest

Main 'Stem Flathead River

Section 1

In this survey, “other” fish species made up the majority (1,271 fish) of the total harvest (1,661 fish) in Section 1 (Table 5). This category included yellow perch, northern pike, largemouth bass, northern squawfish, **peamouth** and others. Lake trout harvest ranked second with 234 fish, followed by westslope cutthroat trout (89 fish). Catch rates were also highest for “other” fish species (Table 5). Harvest data for Section 1 was incomplete due to limited angler interview data for February, March, April, September, October, November and December (Table 6). Therefore, harvest levels were mostly likely underestimated in this report.

Ice fishing on river sloughs during January and February contributed. most of reported harvest for “other” fish species (Table 6). Lake trout were primarily harvested in May as were bull trout and mountain whitefish (Table 6). Westslope cutthroat harvest was greatest in July.

Table 5. Mean harvest rate (fish/angler), harvest and catch rate (fish/hour) estimates for shore angling in Section 1 of the **Flathead River**, May 1992 - May 1993.

Species (Interviews)	Harvest Rate	Variance	Harvest	Variance	Catch Rate	Variance
Shore (N=150)						
Lake Trout	0.58E-01	0.29E-03	234	10801.40	0.11	0.61E-03
Bull Trout	0.27E-02	0.81E-05	21	558.85	0.26E-01	0.75E-04
Westslope Cutthroat Trout	0.49E-01	0.39E-03	89	1742.56	0.84E-01	0.14E-02
Mountain Whitefish	0.23E-02	0.62E-05	13	213.61	0.35E-01	0.84E-03
Lake Whitefish	0.58E-02	0.31E-04	34	1483.08	0.24E-01	0.12E-03
Rainbow Trout	0.00	0.00	0	0.00	0.70E-02	0.26E-04
Other^{1/}	0.24	0.15E-01	1271	396580.00	0.29	0.17E-01
Total	0.36	0.15E-01	1662	421608.00	0.57	0.19E-01

^{1/}Primarily yellow perch, also includes Largemouth bass, northern pike and nongame fish.

Table 6. Monthly harvest estimates for shore angling in Section 1 of the Flathead River, May 1992 - May 1993.

Month	Lake Trout	Bull Trout	Westslope Cutthroat Trout	Mountain Whitefish	Lake Whitefish	Other	Total
Jan					34	671	705
Feb						332	332
Mar							0
Apr						5	5
May	184	21	13	13			231
Jun	42		10				52
Jul			46				46
Aug	8		8			119	135
Sep							0
Oct			12				12
Nov							0
Dec						144	144
Total	234	21	89	13	34	1,271	1662

*Limited or no interview data available.

Section 2

Lake whitefish were by far the most abundant fish species harvested in Section 2, comprising 81 percent of the harvest (Table 7). The catch rate for lake whitefish was 0.9 fish per hour (Table 7). Harvest (17,643 fish) was primarily in fall and early winter months (September through January) and peaked in November (Table 8). According to the records of the commercial fishery, 14,614 pounds of lake whitefish (roughly 8,350 fish) were commercially harvested in October, November and December, 1992. Harvest of lake trout (1,897) and westslope cutthroat trout (1,729) were the next most abundant species harvested (Table 7). Lake trout were often incidentally harvested as part of the lake whitefish fishery and harvest also peaked in November. Cutthroat trout dominated the fish species harvested during summer months, peaking in July (Table 8). Catch rate for cutthroat was over 0.3 fish per hour (Table 7).

Interview data for boat angling was limited or non-existent in Section 2 'during the entire year (Table 3). This led to an underestimation of boat harvest for the section.

Table 7. Mean harvest rate (fish/angler), harvest and catch rate (fish/hour) estimates for Section 2 of the Flathead River, May 1992 - May 1993.

Species (Interviews)	Harvest Rate	Variance	Harvest	Variance	Catch Rate	Variance
Shore (N=481)						
Lake Trout	0.73E-01	0.17E-03	1897	293863.00	0.95E-01	0.19E-03
Bull Trout	0.12E-02	0.14E-05	19	411.73	0.32E-01	0.70E-04
Westslope Cutthroat Trout	0.10	0.49E-03	1467	131058.00	0.30	0.28E-02
Mountain Whitefish	0.53E-02	0.89E-05	74	1902.13	0.29E-01	0.18E-03
Lake Whitefish	0.86	0.45E-02	17643	0.72E+07	0.92	0.47E-02
Rainbow Trout	0.92E-02	0.18E-04	126	3631.86	0.34E-01	0.96E-04
Other	0.17E-02	0.16E-05	24	318.75	0.99E-02	0.12E-04
Total	1.05	0.55E-02	21250	0.93E+07	1.43	0.89E-02
Boat (N=13)*						
Lake Trout	0.00	0.00	0	0.00	0.00	0.00
Bull Trout	0.00	0.00	0	0.00	0.37E-01	0.61E-03
Westslope Cutthroat Trout	0.83E-01	0.29E-02	262	33372.60	1.70	0.23
Whitefish	0.13E-01	0.00	196	3422.85	0.14	0.00
Lake Whitefish	0.00	0.00	0	0.00	0.37E-01	0.13E-02
Rainbow Trout	0.00	0.00	0	0.00	0.91E-01	0.33E-02
Other	0.00	0.00	0	0.00	0.37E-01	0.16E-02
Total	0.96E-01	0.29E-02	458	36795.50	2.04	0.30
Combined (N=494)						
Lake Trout	0.71E-01	0.16E-03	1897	293863.00	0.92E-01	0.18E-03
Bull Trout	0.11E-02	0.13E-05	19	411.73	0.32E-01	0.67E-04
Westslope Cutthroat Trout	0.10	0.47E-03	1729	164431.00	0.34	0.23E-02
Mountain Whitefish	0.55E-02	0.84E-05	270	5324.98	0.32E-01	0.17E-03
Lake Whitefish	0.84	0.43E-02	17643	0.72E+07	0.90	0.45E-02
Rainbow Trout	0.89E-02	0.17E-04	126	3631.86	0.35E-01	0.94E-04
Other	0.17E-02	0.15E-05	24	318.75	0.11E-01	0.13E-04
Total	1.03	0.52E-02	21708	0.94E+07	1.44	0.86E-02

* Limited interview data from boat anglers resulted in an underestimate of harvest in this section.

Table 8. Monthly harvest estimates for Section 2 of the Flathead River, May 1992 - May 1993.

Month	Lake Trout	Bull Trout	Westslope Cutthroat Trout	Mountain Whitefish	Lake Whitefish	Rainbow Trout	Other	Total
Jan					742			742
Feb								0
Mar								0
Apr								0
May	23		78					101
Jun	217	19	306	21	77	19		659
Aug			305					305
Jul	13		932	249	41	107	13	1355
Sep	140		32		253			425
Oct	303		76		5028			5407
Nov	1201				8864		11	10076
Dec					2638			2638
Total	1897	19	1729	270	17643	126	24	21708

Limited or no interview data available.

Section 3

Westslope cutthroat dominated the harvest and catch rate in Section 3 (Table 9). An estimated 1,303 cutthroat trout were harvested; of which 1,069 were harvested in July (Table 10). Catch rate for cutthroat trout was 0.7 fish per hour. Estimated mountain whitefish harvest was zero for the section, although the catch rate for mountain whitefish was the third highest (Table 9). With the exception of lake whitefish, all harvest for Section 3 was observed from May through September.

Table 9. Mean harvest rate (fish/angler), harvest and catch rate (fish/ho&) estimates for Section 3 of the Flathead River, May 1992 - May 1993.

Species (Interview)	Harvest Rate	Variance	Harvest	Variance	Catch Rate	Variance
Shore (N=151)						
Lake Trout	0.19E-01	0.65E-04	113	1929.27	0.22E-01	0.65E-04
Bull Trout	0.65E-02	0.22E-04	36	1053.17	0.35E-01	0.13E-03
Westslope Cutthroat Trout	0.13	0.86E-03	458	17331.40	0.63	0.10E-01
Mountain Whitefish	0.93E-02	0.17E-20	0	0.00	0.69E-01	0.38E-03
Lake Whitefish	0.33E-01	0.00	575	225234.00	0.33E-01	0.00
Rainbow Trout	0.19E-01	0.78E-04	78	1856.52	0.96E-01	0.77E-03
Other	0.13E-01	0.73E-04	47	1063.95	0.13E-01	0.73E-04
Total	0.23	0.12E-02	1307	251701.00	0.90	0.14E-01
Boat (N=8)						
Lake Trout	0.00	0.00	0	0.00	0.00	0.00
Bull Trout	0.00	0.00	0	0.00	0.20E-01	0.28E-03
Westslope Cutthroat Trout	0.34	0.11E-01	845	129583.00	1.38	0.20E-01
Mountain Whitefish	0.00	0.00	0	0.00	0.00	0.00
Lake Whitefish	0.00	0.00	0	0.00	0.59	0.10
Rainbow Trout	0.20E-01	0.43E-03	48	2699.35	0.10	0.59E-02
Other	0.17	0.26E-01	721	616139.00	0.23	0.48E-01
Total	0.53	0.42E-01	1614	789759.00	2.32	0.19
Combined (N=159)						
Lake Trout	0.18E-01	0.59E-04	113	1929.27	0.21E-01	0.58E-04
Bull Trout	0.62E-02	0.20E-04	36	1053.17	0.35E-01	0.12E-03
Westslope Cutthroat Trout	0.14	0.80E-03	1303	146915.00	0.67	0.94E-02
Mountain Whitefish	0.89E-02	0.15E-20	0	0.00	0.65E-01	0.34E-03
Lake Whitefish	0.32E-01	0.00	575	225234.00	0.61E-01	0.26E-03
Rainbow Trout	0.19E-01	0.71E-04	126	4555.87	0.97E-01	0.71E-03
Other	0.21E-01	0.13E-03	768	617203.00	0.24E-01	0.19E-03
Total	0.24	0.12E-02	2921	0.10E+07	0.97	0.13E-01

* Limited interview data from boat anglers resulted in an underestimate of harvest in this section.

Table 10. Monthly harvest estimates for Section 3 of the Flathead River, May 1992 - May 1993.

Month	Lake Trout	Bull Trout	Westslope Cutthroat Trout	Mountain Whitefish	Lake Whitefish	Rainbow Trout	Other	Total
Jan*								0
Feb*								0
Mar*								0
Apr*								0
May		24	113			25		162
Jun	58	12	89			45	22	226
Jul			1068			56	73	1197
Aug			33				673	706
Sep*	55							55
Oct*					104			104
Nov*					471			471
Dec*								0
Total	113	36	1303		575	126	768	2921

* Limited or no interview data available.

Section 4

Westslope cutthroat trout comprised 90 percent of fish harvest from Section 4 (Table 11). As in Section 3, catch rate for cutthroat trout in Section 4 (0.6 fish per hour) was also greatest. Cutthroat trout were harvested May through October, peaking in August and September (Table 12). There were only seven boat interviews for the entire year, which resulted in a zero estimate of harvest from boats. Most likely, harvest was greater than reported values.

Table 11. Mean harvest rate (fish/angler), harvest and catch rate (fish/hour) estimates for Section 4 of the Flathead River, May 1992 - May 1993.

Species (Interviews)	Harvest Rate	Variance	Harvest	Variance	Catch Rate	Variance
Shore (N=117)						
Lake Trout	0.26E-02	0.76E-05	7	77.45	0.51E-02	0.14E-04
Bull Trout	0.87E-02	0.65E-04	17	292.43	0.55E-01	0.66E-03
Westslope Cutthroat Trout	0.34	0.86E-02	1910	863417.00	0.63	0.18E-01
Mountain Whitefish	0.12E-01	0.11E-03	20	361.19	0.37E-01	0.14E-03
Lake Whitefish	0.20E-01	1.00E-04	70	5198.68	0.51E-01	0.75E-03
Rainbow Trout	0.22E-01	0.22E-03	43	1074.07	0.59E-01	0.85E-03
Other	0.55E-02	0.26E-04	46	4800.36	0.25E-01	0.22E-03
Total	0.41	0.11E-01	2113	955904.00	0.86	0.25E-01
Boat (N=7)						
Lake Trout	0.00	0.00	0	0.00	0.22	0.29E-01
Bull Trout	0.00	0.00	0	0.00	0.00	0.00
Westslope Cutthroat Trout	0.00	0.00	0	0.00	0.78	0.17
Mountain Whitefish	0.00	0.00	0	0.00	0.00	0.00
Lake Whitefish	0.00	0.00	0	0.00	0.34	0.14E-01
Rainbow Trout	0.00	0.00	0	0.00	0.13	0.67E-02
Other	0.00	0.00	0	0.00	0.00	0.00
Total	0.00	0.00	0	0.00	1.46	0.41
Combined (N=124)						
Lake Trout	0.25E-02	0.67E-05	7	77.45	0.17E-01	0.11E-03
Bull Trout	0.82E-02	0.58E-04	17	292.43	0.52E-01	0.59E-03
Westslope Cutthroat Trout	0.32	0.77E-02	1910	863417.00	0.64	0.16E-01
Mountain Whitefish	0.11E-01	0.10E-03	20	361.19	0.35E-01	0.12E-03
Lake Whitefish	0.19E-01	0.89E-04	70	5198.68	0.67E-01	0.71E-03
Rainbow Trout	0.21E-01	0.19E-03	43	1074.07	0.62E-01	0.78E-03
Other	0.52E-02	0.23E-04	46	4800.36	0.24E-01	0.19E-03
Total	0.39	0.95E-02	2113	955904.00	0.89	0.24E-01

* Limited interview data from boat anglers resulted in an underestimate of harvest in this section.

Table 12. Monthly harvest estimates for Section 4 of the Flathead River, May 1992 - May 1993.

Month	Lake Trout	Bull Trout	Westslope Cutthroat Trout	Mountain Whitefish	Lake Whitefish	Rainbow Trout	Other	Total
Jan								0
Feb*								0
Mar								0
Apr*								0
May	7		52					59
Jun		17	87	11	17	43		175
Jul			294				2	296
Aug			600					600
Sep*			663		44		44	751
Oct*			214	9	9			232
Nov*								0
Dec*								0
Total	7	17	1910	20	70	43	46	2113

* Limited or no interview data available.

North Fork Sections

Westslope cutthroat trout dominated the fish harvest and had the highest catch rate in all three North Fork sections (Tables 13, 14, 15). The monthly harvest was greatest during July in all sections (Tables 16, 17 and 18). Catch rate for cutthroat trout was greatest (1.4 fish per hour) in Section 1 and lowest (0.6 fish per hour) in Section 2. In 1981, westslope cutthroat comprised 91 percent of **gamefish** harvest (17,996 fish) on the North Fork, followed by mountain whitefish (6 percent) and bull trout (2 percent) (Fredenberg and Graham 1983). In 1992-1993, 3,454 **gamefish** were harvested of which 90 percent (3,119) were westslope cutthroat.

Rainbow trout were the second most abundant species harvested in Section 1, followed by lake whitefish (Table 13). In Section 2, the order was the opposite, more lake whitefish were harvested than rainbow trout (Table 14). In Section 3, mountain whitefish were the second most abundant fish species harvested, followed by lake whitefish (Table 15). Prior to calculating the harvest estimate for shore angling, catch and harvest data from shore and boat angler interviews were combined to increase sample size. It was assumed that catch and harvest were similar among shore and boat anglers. For the North Fork, 61 out of 643 interviews were boat anglers. Due to limited number of boat interviews, we could not estimate harvest and catch for boat angling within each strata.

Table 13. Mean harvest rate (fish/angler), **harvest** and catch rate (fish/hour) estimates for shore angling in Section 1 of the North Fork **Flathead** River, May 1992 - May 1993.

Species (Interviews)	Harvest Rate	Variance	Harvest	Variance	Catch Rate	Variance
Shore (N=387)						
Lake Trout	0.95E-03	0.36E-08	0	0.00	0.11E-01	0.81E-04
Bull Trout	0.90E-03	0.82E-06	7	57.10	0.25E-01	0.51E-04
Westslope Cutthroat Trout	0.19	0.96E-03	2568	297868.00	1.37	0.17E-01
Mountain Whitefish	0.00	0.00	0	0.00	0.16E-01	0.69E-04
Lake Whitefish	0.55E-02	0.11E-04	72	1804.38	0.48E-01	0.31E-03
Rainbow Trout	0.83E-02	0.24E-04	137	9750.92	0.81E-01	0.51E-03
Other	0.29E-02	0.81E-05	31	986.55	0.19E-01	0.16E-03
Total	0.21	0.98E-03	2815	329531.00	1.57	0.18E-01

Table 14. Mean harvest rate (fish/angler), harvest and catch rate (fish/hour) estimates for shore angling in Section 2 of the North Fork **Flathead** River, May 1992 - May 1993.

Species (Interviews)	Harvest Rate	Variance	Harvest	Variance	Catch Rate	Variance
Shore (N=75)						
Lake Trout	0.00	0.00	0	0.00	0.79E-02	0.31E-04
Bull Trout	0.00	0.00	0	0.00	0.36E-01	0.41E-03
Westslope Cutthroat Trout	0.14	0.16E-02	304	12213.90	0.57	0.13E-01
Mountain Whitefish	0.00	0.00	0	0.00	0.35E-01	0.94E-03
Lake Whitefish	0.15E-01	0.21E-03	24	664.98	0.25E-01	0.27E-03
Rainbow Trout	0.41E-02	0.18E-04	8	88.64	0.37E-01	0.86E-03
Other	0.00	0.00	0	0.00	0.38E-01	0.90E-03
Total	0.14	0.23E-02	336	15323.70	0.75	0.16E-01

Table 15. Mean harvest rate (fish/angler), harvest and catch rate (fish/hour) estimates for shore angling in Section 3 of the North Fork Flathead River, May 1992 - May 1993.

Species (Interviews)	Harvest Rate	Variance	Harvest	Variance	Catch Rate	Variance
Shore (N=48)						
Lake Trout	0.00	0.00	0	0.00	0.00	0.00
Bull Trout	0.00	0.00	0	0.00	0.22E-01	0.27E-03
Westslope Cutthroat Trout	0.11	0.51E-02	247	52342.60	1.03	0.68E-01
Mountain Whitefish	0.21E-01	0.31E-03	31	1000.36	0.10	0.49E-02
Lake Whitefish	0.16E-01	0.28E-03	23	791.24	0.35	0.18E-01
Rainbow Trout	0.00	0.00	0	0.00	0.50E-01	0.90E-03
Other	0.00	0.00	0	0.00	0.00	0.00
Total	0.14	0.68E-02	301	59140.80	1.55	0.84E-01

Table 16. Monthly harvest estimates for shore angling in Section 1 of the North Fork Flathead River, May 1992 - May 1993.

Month	Bull Trout	Westslope Cutthroat Trout	Lake Whitefish	Rainbow Trout	Other	Total
Jan*						0
Feb*						0
Mar*						0
Apr*						0
May		22				22
Jun	7	714		7		728
Jul		1584	64	122	31	1801
Aug		219	8	8		235
Sep		29				29
Oct*						0
Nov*						0
Dec*						0
Total	7	2568	7 2	137	31	2815

* Limited or no interview data available.

Table 17. Monthly **harvest** estimates for shore angling in Section 2 of the North Fork Flathead River, May 1992 - May 1993.

Month	Westslope Cutthroat Trout	Lake Whitefish	Rainbow Trout	Total
Jan*				0
Feb*				0
Mar*				0
Apr*				0
May*				0
Jun	55			55
Jul	96	24	8	128
Aug	40			40
Sep	113			113
Oct*				0
Nov*				0
Dec*				0
Total	304	24	8	336

*Limited or no interview data available.

Table 18. Monthly harvest estimates for shore angling in Section 3 of the North Fork Flathead River, May 1992 - May 1993.

Month	Westslope Cutthroat Trout	Mountain Whitefish	Lake Whitefish	Total
Jan*				0
Feb*				0
Mar*				0
Apr*				0
May*				0
Jun				0
Jul	184			184
Aug	63	31	23	117
Sep*				0
Oct*				0
Nov*				0
Dec*				0
Total	247	31	23	301

*Limited or no interview data available.

Middle Fork Sections

There were very few angler interviews collected in both Middle Fork sections. Prior to estimating shore harvest, shore and boat angler catch and harvest data were combined to increase sample size of interviews. It was assumed catch and harvest were similar between shore and boat anglers. Due to lack of data for some strata, harvest was most likely underestimated by reported values. We did not estimate harvest and catch for boat anglers due to limited data within all strata.

In Section 1, westslope cutthroat trout comprised 96 percent of harvest with a catch rate of 1.1 fish per hour (Table 19). The “other” fish species harvested were eastern brook trout. Harvest was observed from June through September (Table 20).

Estimated harvest in Section 2 was zero fish (Table 21). Limited interviews indicated that westslope cutthroat, bull trout and mountain and lake whitefish were caught and released. The catch rate for cutthroat (1.1 fish per hour) was equal to that in Section 1.

Table 19. Mean harvest rate (fish/angler), harvest and catch rate (fish/hour) estimates for shore angling in Section 1 of the Middle Fork Flathead River, May 1992 - May 1993.

Species (Interviews)	Harvest Rate	Variance	Harvest	Variance	Catch Rate	Variance
Shore (N=77)						
Lake Trout	0.58E-01	0.10E-03	0	0.00	0.58E-01	0.10E-03
Bull Trout	0.00	0.00	0	0.00	0.93E-02	0.13E-04
Westslope Cutthroat Trout	0.59E-01	0.65E-03	556	46907.90	1.11	0.20E-01
Mountain Whitefish	0.16E-02	0.28E-05	8	84.66	0.25E-01	0.16E-03
Lake Whitefish	0.13	0.46E-03	0	0.00	0.13	0.46E-03
Rainbow Trout	0.00	0.00	0	0.00	0.97E-02	0.45E-04
Other	0.30E-02	0.47E-05	16	153.89	0.45E-02	0.70E-05
Total	0.26	0.16E-02	580	47454.90	1.35	0.22E-01

Table 20. Monthly harvest estimates for shore angling in Section 1 of the Middle Fork Flathead River, May 1992 - May 1993.

Month	Westslope Cutthroat Trout	Mountain Whitefish	Other	Total
Jan'				0
Feb'				0
Mar'				0
Apr'				0
May'				0
Jun	322			322
Jul	129		8	137
Aug	64	8	8	80
Sep'	41			41
Oct'				0
Nov'				0
Dec'				0
I Total	556	a	16	580

' Limited or no interview data available.

Table 2 1. Mean harvest rate (fish/angler), harvest and catch rate (fish/hour) estimates for shore angling in Section 2 of the Middle Fork Flathead River, May 1992 - May 1993.

Species (Interviews)	Harvest Rate	Variance	Harvest	Variance	Catch Rate	Variance
Shore (N=27)						
Lake Trout	0.00	0.00	0	0.00	0.00	0.00
Bull Trout	0.00	0.00	0	0.00	0.16E-01	0.15E-04
Westslope Cutthroat Trout	0.00	0.00	0	0.00	1.14	0.18
Mountain Whitefish	0.00	0.00	0	0.00	0.20E-01	0.82E-04
Lake Whitefish	0.00	0.00	0	0.00	0.34E-02	0.15E-04
Rainbow Trout	0.00	0.00	0	0.00	0.00	0.00
Other	0.00	0.00	0	0.00	0.00	0.00
Total	0.00	0.00		0.00	1.18	0.18

SUMMARY AND RECOMMENDATIONS

From May 1992 to May 1993, we estimated that 95,423 hours were spent angling on the main stem, North and Middle forks of the **Flathead** River. The main stem received over 55 percent of the angler pressure. The North Fork received over 31 percent and roughly 14 percent was spent on the Middle Fork.

The relative abundance of fish species harvested during 1992 and 1993 was dramatically different than reported in previous surveys. In 1981, 89,273 **gamefish** were harvested on the entire main stem, of which 86 percent were kokanee, 10 percent were westslope cutthroat and 2 percent were bull trout (Fredenberg and Graham 1983). In this survey, over 32,400 fish were harvested in the study area. Lake whitefish comprised 57 percent of harvest, followed by westslope cutthroat trout which made up 27 percent of harvest (Figure 4). Section 2, on the main stem, provided 67 percent of all fish harvested.

In all river sections, catch rates were higher than harvest rates for westslope cutthroat. It is important to note the differences between catch and harvest. In this survey, catch refers to all fish caught by anglers including fish which were harvested and fish which were released. Harvest estimates include only fish which were kept by anglers. Many anglers practiced catch and release while fishing the **Flathead** River. In the main stem sections, catch rate ranged from two to five times greater than harvest rate. In the North Fork sections, catch rate ranged from four to nine times greater than harvest rate. In the Middle Fork, the difference was even greater. In Section 1, catch rate was 19 times greater than harvest rate. In Section 2, the catch rate was 1.14 fish per hour and the estimated harvest was zero.

For other fish species, the difference between catch and harvest was less pronounced. For lake trout, harvest rates were more similar to catch rates. In sections 2 and 3 of the main stem, catch and harvest rates were roughly equal. For sections 1 and 4, catch rates were roughly twice the harvest rate. In Section 2 of the main stem, anglers kept almost all of the lake whitefish caught.

Pressure, catch and harvest estimates were not calculated for all strata due to limitations in the number of completed angler interviews. If interview data were not available for a specific stratum then the program could not calculate angler use levels. Interviews were not collected during each stratum for a number of reasons, including the inability to locate anglers, non-returned mail-in creel cards and limited seasonal use. We reported use estimates when interview data were collected and reported no use when interview data were not available. This method underestimated angler use of the **Flathead** River. However, we believe the reported use for strata where interviews were collected was more accurate than if we combined all strata with and without interview data to obtain use estimates for the entire period. In future creel surveys, survey effort should be increased to collect angler interview data in all strata. This may require targeting specific low use periods when anglers are less numerous and more difficult to contact.

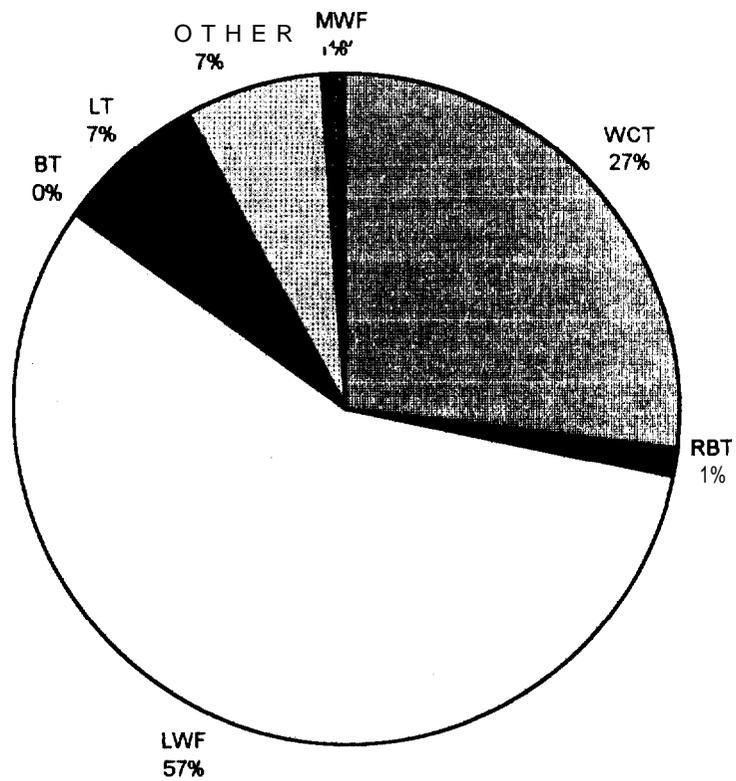


Figure 4. Percentage of total harvest for fish species caught in the **Flathead** River, May 1992 - May 1993 (LWF = Lake Whitefish, RBT = Rainbow Trout, WCT = Westslope Cutthroat Trout, MWF = Mountain Whitefish, BT = Bull Trout, LT = Lake Trout and OTHER = Other Fish Species).

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